

Correlation between brain volume change and T2 relaxation time in patients with clinically isolated syndrome

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Background and objective: Regional volumetric studies have suggested that reversible brain volume changes (pseudoatrophy) are mostly confined to the white matter. The aim of this study is to correlate pseudo-T2 values (a marker of hydration status) with brain volume changes in patients with clinically isolated syndrome (CIS).

Materials and Methods: 96 patients with CIS were included (62 women; median age, 33 years; age range, [19, 49]; EDSS median, 2; EDSS range, [0, 4.5]; mean disease duration, 3.78 months). Baseline and 12 months dual echo T2-weighted, and 3D T1-weighted (MPRAGE) sequences were acquired on a 3.0T. The dual-echo sequence was used to produce pseudo-T2 maps (pT2). Pseudo-T2 values were evaluated in regions of normal appearing white matter. MPRAGE sequence was used to obtain white and grey matter volumetric fractions. Changes between month 12 and baseline studies in pT2, white and grey matter fractions were evaluated by the Spearman rank correlation.

Results: A significant, although weak positive correlation ($r=0.276$, $p=0.006$) between changes in pT2 and changes in white matter was found. Changes in grey matter did not correlate with changes in pT2 ($r=-0.002$, $p=0.982$).

Conclusions: The results suggest that white matter volume changes in patients with multiple sclerosis can be partially explained by fluctuations in brain water. They also support the value of pseudo-T2 measures to assess white matter water changes, and its potential role in distinguishing reversible (pseudoatrophy) from irreversible (atrophy) brain tissue loss.